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Associations between neighbourhood walkability and cycling in Denmark

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Abstract
Background: Previous research has established four environmental attributes that contribute to neighbourhood 'walkability': street connectivity, land use mix, residential density, and retail floor area ratio. There is emerging evidence that these attributes influence not only walking behaviour but also cycle use. Given the significant health benefits associated with regular commuter cycling, an understanding of the environmental correlates of cycling is essential. The aim of this study was to examine the link between walkability and transportation choices across three Danish cities where cycling culture differs and bicycle share is much higher than in most other countries.

Methods: Geospatial and transportation data representing 123 geographic zones were extracted from the Danish National Transportation Survey. A geographic information system was used to calculate a walkability index for each zone by combining z-scores for street connectivity, land use mix, residential density, and retail floor area ratio. Multiple linear regression was used to quantify the associations between walkability and the mean walking, cycling, and passive transportation practices for each zone.

Results: Walkability index scores were positively correlated (Spearmann's rho scores) with active transportation: mean kilometres cycled: 0.43 ($p<0.001$), mean cycling trips: 0.53 ($p<0.001$), mean kilometres walked: 0.45 ($p<0.001$) and mean walking trips: 0.55 ($p<0.001$). Conversely, negative correlations were observed between walkability and passive transportation (mean kilometres: -0.39 ($p<0.001$) and mean number of trips -0.61 ($p<0.001$).

Conclusion: Built environment factors related to walking behaviour are also applicable to cycling in Denmark. This information is potentially useful for future transport and planning policy in Denmark and other European countries.